Tool Engineer

Vol. III. No. 11.

MARCH

1935

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"Cold reason, not mass hysteria, should direct the creative engineering worker's vocational organization"

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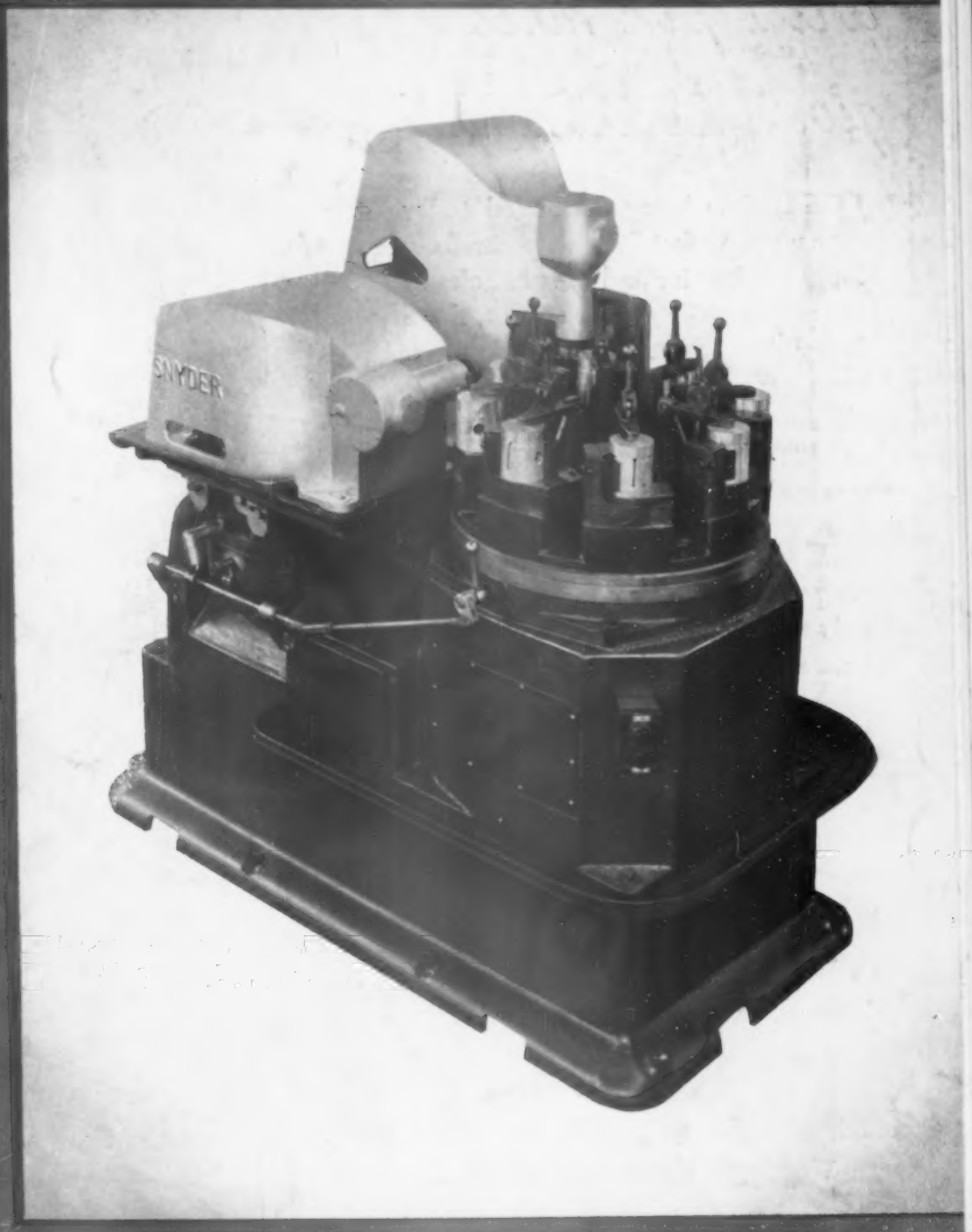

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Official Publication of the

AMERICAN SOCIETY OF TOOL ENGINEERS

HEALD

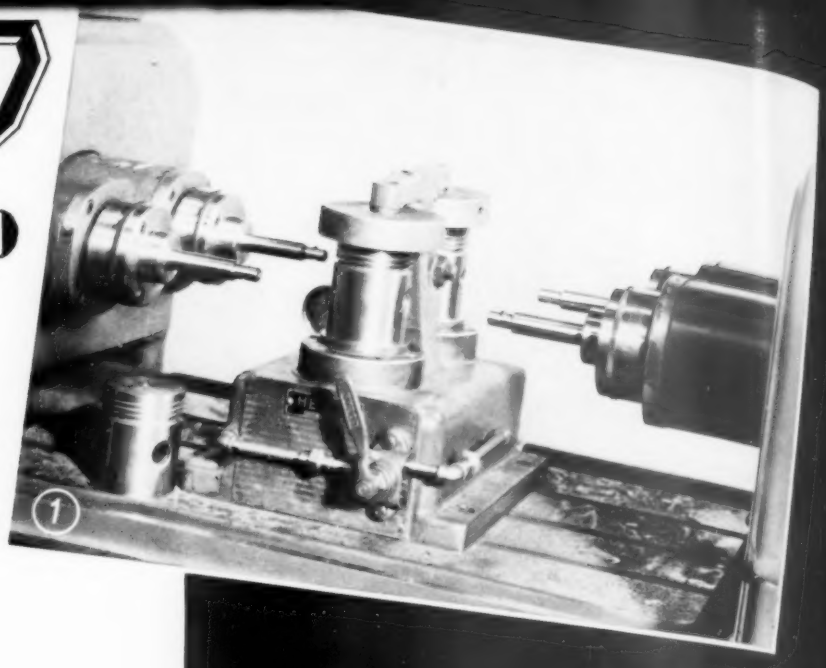
PRECISION BORED *wrist pin holes* *give* PERFECT FIT

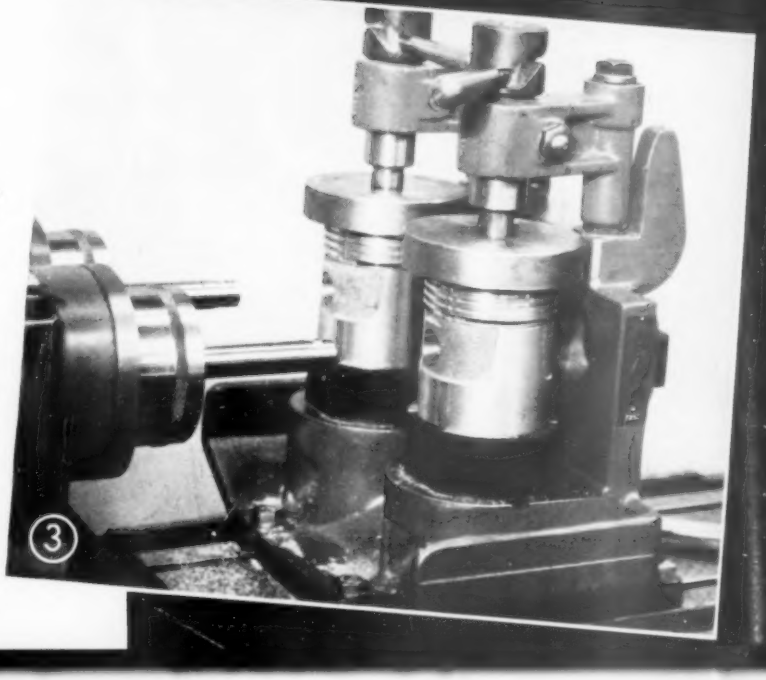
THERE is being demanded today a more perfect fit between carefully lapped wrist pins and the pin holes in the pistons. To obtain this fit, there is required greater precision for roundness, straightness, finish and alignment of holes with each other as well as with the side walls, when machining the wrist pin holes.

• • Heald Bore-Matics as illustrated are performing this operation by not only meeting requirements but often bettering them and at a lower cost.

• • One advantage of the Heald Bore-Matic is the table control which can be easily set to bore one side, jump the gap at high speed and bore the other side, thus the machine is almost continuously cutting.

• • We would like to send you full data on the modern way of finishing wrist pin holes.





THE HEALD MACHINE COMPANY

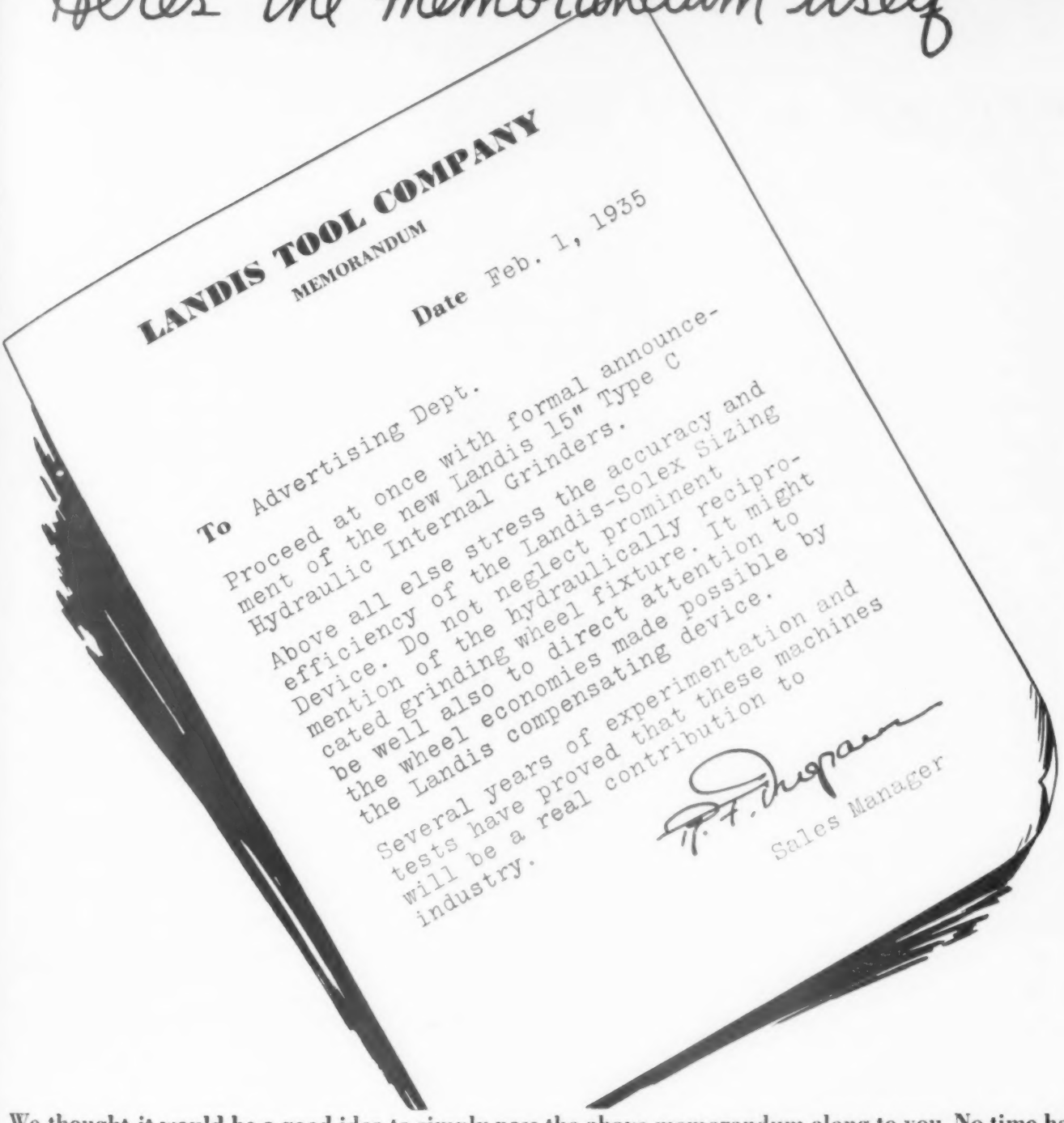
Worcester, Massachusetts, U. S. A.

No. 1. Heald No. 46A Bore-Matic precision boring wrist pin holes in cast iron pistons directly from a drilled hole. The holes are rough bored by the left hand boring heads and finish bored by the right. The piston is centralized by a V block and held by clamps, air controlled.

No. 2. Turning the O. D. of a tractor piston. The wrist pin holes were also bored on this Heald No. 47 Bore-Matic.

No. 3. Precision boring wrist pin holes on the Heald No. 48 Bore-Matic. Pistons are located by a hand plug and held by a quick acting hand operated fixture.

Here's the memorandum itself—



LANDIS TOOL COMPANY
MEMORANDUM

Date Feb. 1, 1935

To Advertising Dept.

Proceed at once with formal announcement of the new Landis 15" Type C Hydraulic Internal Grinders.

Above all else stress the accuracy and efficiency of the Landis-Solex Sizing Device. Do not neglect prominent mention of the hydraulically reciprocated grinding wheel fixture. It might be well also to direct attention to the wheel economies made possible by the Landis compensating device.

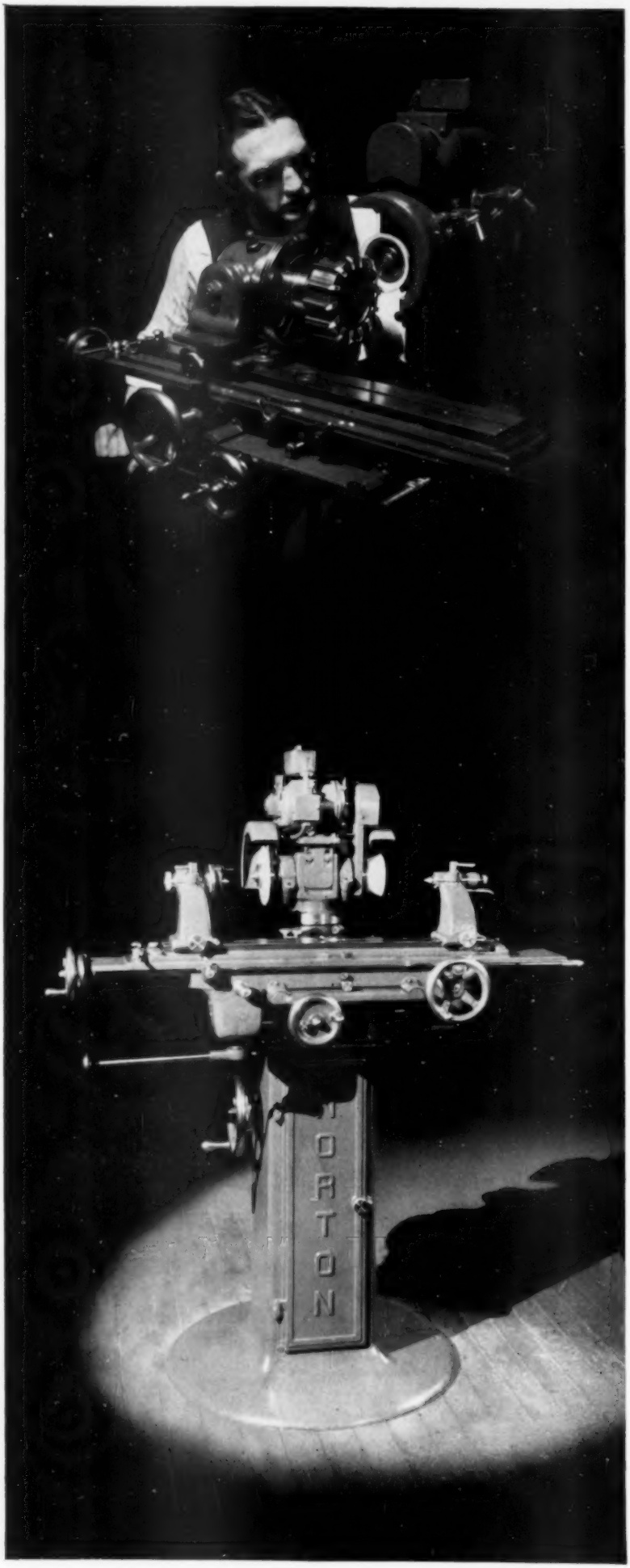
Several years of experimentation and tests have proved that these machines will be a real contribution to industry.

W. F. Dugan
Sales Manager

We thought it would be a good idea to simply pass the above memorandum along to you. No time has been taken to prepare a fancy advertisement. Instead our energies have been concentrated on the preparation of an interesting and complete catalog describing these new Landis 15" Type C Hydraulic Internals . . . Ask us for a copy of catalog No. E-35 now. The printer will have made delivery, we feel certain, by the time we receive your request. 191

LANDIS TOOL CO.
WAYNESBORO, PA.

held by a quick acting hand operated fixture.



Convenience... Adaptability...

THAT'S what you want in a Tool and Cutter Grinder and that's what you get in the Norton No. 1. Conveniently located controls—interchangeable from one side to the other to suit the habits of the individual and the particular job at hand. Conveniently arranged—enabling the operator to sit right up there close to his work, straddle the base and do his job without cussin' or fussin' about "this lever should be here" or "that handwheel should be there."

A variety of arrangements makes it adaptable to any tool room operation. External cylindrical, internal and surface grinding operations can be performed to say nothing of reamers and milling cutters—with either National Standard or B & S tapered shanks.

The price? Why, depending on the equipment, it ranges from $600 to about $975 (f.o.b. Worcester) without motors. Now, what do you think of that?

NORTON COMPANY
Worcester, Mass.
New York, Chicago, Detroit
Cleveland, Hartford
London

NORTON GRINDING MACHINES

NORTON PRODUCTS—Grinding Machines; Lapping Machines • Grinding Wheels; Abrasive for Polishing; Pulpstones • Laboratory Ware; Refractories; Porous Plates and Tubes • Non-slip Tile, Treads and Aggregates; Behr-Manning Abrasive Papers and Cloth • Norton Pike Sharpening Specialties.

M-336

This publication is giving identity to the profession of tool engineering—help this cause by mentioning *The Tool Engineer* to advertisers.

The Tool Engineer

Official Publication of the AMERICAN SOCIETY OF TOOL ENGINEERS

Vol. III | March, 1935 | No. 11

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PROFESSIONAL ENTITY

To promote professional entity to Tool Engineering is one of the primary purposes of the American Society of Tool Engineers—founded but three years ago in Detroit. In this brief period this Society has come to high prominence and respect, numbering its members in many parts of the world. Every practical manufacturing executive owes it to himself to advance the profession of which he is a part. If you have not yet joined with us in this worthy cause, *write now*, for your application blank and full details. The cost is so nominal it is not a factor—the important thing is to do your part now.

Address—*The Tool Engineer*
6432 Cass Avenue
Detroit, Michigan

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NRA MEMBER U.S.
WE DO OUR PART

The May Issue of *The Tool Engineer* will be a SPECIAL EDITION on GAGES AND PRECISION MEASUREMENTS Watch for it

Application blanks and information pertaining to membership in the American Society of Tool Engineers may be had by addressing *The Tool Engineer*, 6432 Cass Avenue, Detroit, Michigan, or the Secretary's office, 8316 Woodward Ave., Detroit, Mich.

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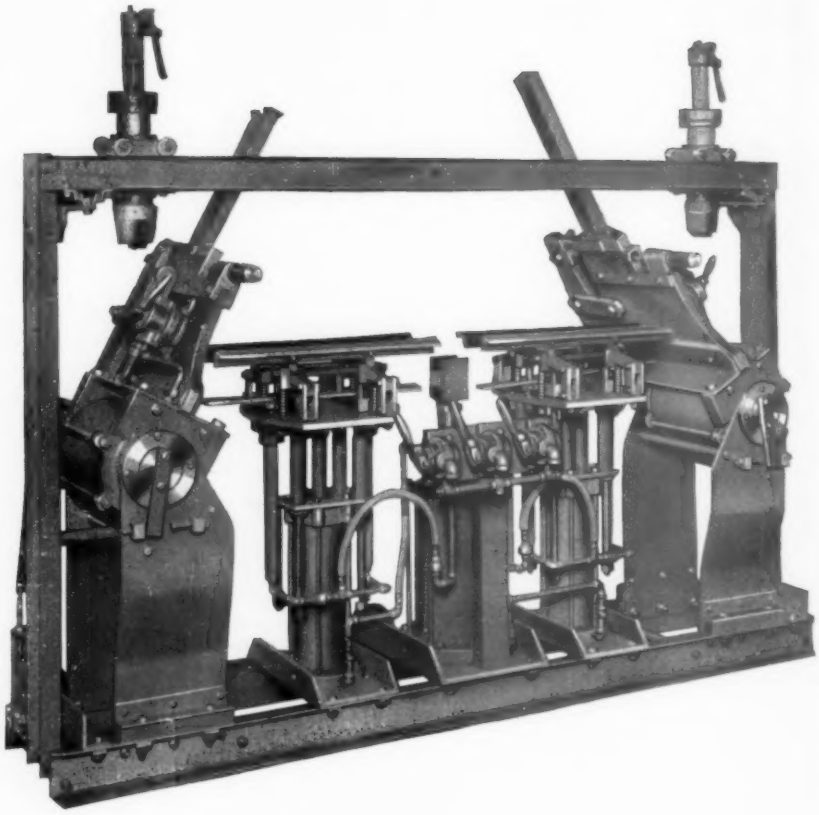
FASTER PRODUCTION MADE EASY



SPRING cover assembly is a typical example of an apparently complicated manufacturing operation handled with almost unbelievable speed and simplicity on this special production equipment designed by Hannifin engineers.

This air-operated spring cover assembling machine performs the following operations: 1. presses shackle pins in both spring eyes, 2. straightens spring while operators apply graphite and canvas, and set metal covers, 3. jaw closing mechanism squeezes metal covers in place around the spring, 4. operators insert spring cover top plate, 5. advancing pneumatic hammers close double lock seam over top cover plate.

Two operators easily maintain a steady production rate of 50 to 60 springs per hour.

Compressed air presents an unusually adaptable source of power for production assembly operations. Over 26 years of specialized experience enables Hannifin engineers to give authoritative advice on pneumatic and hydraulic production tool equipment for any high speed manufacturing operation.

Hannifin Spring Cover Assembling Machine is being used for the assembly of metal spring covers on the following automobiles:

AUBURN
BUICK
CADILLAC
CHEVROLET
CHEVROLET (Canada)
CHRYSLER
DODGE
LA SALLE
OLDSMOBILE
PACKARD
PONTIAC
REO
STUDEBAKER

HANNIFIN MANUFACTURING COMPANY
ENGINEERS • DESIGNERS • MANUFACTURERS
Pneumatic and Hydraulic Production Tool Equipment
621-631 SOUTH KOLMAR AVENUE, CHICAGO, ILLINOIS
Detroit Office: Hayward Building, 4829 Woodward Avenue, Tel. Columbia 4949
R. A. Bean, Manager

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MARCH MEETING

(DETROIT)
HOTEL FORT SHELBY BALLROOM

March 14th, (Thursday)

Dinner: 6:00 P. M.
Meeting: 8:00 P. M.

"Hydraulic Feed Mechanisms for Drilling and Boring Machines and Electrical Controls"

Speaker: R. Schafer

Development Engineer, National Automatic Tool Company

This meeting has been arranged through the courtesy of Mr. E. Frank and Mr. E. Harper, A. S. T. E. Member. It undoubtedly will be one of the most instructional as well as interesting meetings of the year. Mr. Schafer is very well qualified to speak on his subject. For many years he was connected with Buick, also with Western Electric, Willys-Overland and Savage Arms. Stereoptican Slides will be used to illustrate the practical applications of hydraulic feed mechanisms Mr. Schafer will describe.

Special Music and Entertainment.

Make your reservations early to participate in prize drawing. Tickets purchased at the door will *not* entitle you to participation in prize drawing.

PRODUCTION PERSPECTIVES

• • •

The past thirty days would seem to indicate that depression days are over—for the time being at least—so far as **production** in metal working industries are concerned. Certainly this is evident in the Detroit area where many shops these days are working full tilt and with **larger payrolls** than at any time during the past four years. **Carboloy,** we note, reports orders for January 1935 represented an increase of 125% over January 1934. The number of men on their factory payroll January 31st this year was 86% in excess of the number on the same date in 1934. It is understood this company is at present working **three shifts,** daily.

A.S.T.Eers have had their part, too, in the rush of the past month—some are now taking a well deserved vacation . . . . notably our good friend **Swan Bergstrom,** who is vacationing in Mexico for a month, and **E. Harper,** A.S.T.Eer who has left for a vacation in Florida. **Ray Farmer,** A.S.T.E. Director has taken "time out" from his many duties at Cadillac Motor long enough to be **elected President** of the Auto City Racing Association. He was elected at a meeting of the association held at the Log Cabin Inn, February 20th and will serve as head of the group for a year. "The association," says Ray, "is pointing to a **big** season when auto racing gets under way here in about two months." **Claude Williams,** Chrysler Purchasing Agent, we hear won a $50 cash prize . . . . but . . . . did not know of it until a week later, when some friend called him by phone to tell him. "Was he *surprised*." Ask him. **Mr. Seibert,** formerly of the Eureka Tool Company is now connected with Hotchkiss Tool & Die Company, we hear. We wish you lots of success, Mr. Seibert. We were sorry to hear of the automobile accident of **Walter Cahill,** A.S.T.Eer, but glad to hear more recently that Walter is recuperating, very nicely.

One shop we saw the other day has made a splendid addition to its plant facilities. The plant is the **Snyder Tool & Engineering Company** in Detroit who have added a new building bringing the total floor space in excess of twenty thousand square feet. The new building has a large overhead crane, and will be largely devoted to the building of heavy special machinery. A new Blanchard No. 16 in addition to other equipment is or has been added to present equipment. **Vickers** new addition, doubling their plant capacity, is very near completion.

Our very loyal good friend and member **"O.B." Jones** has been as busy "as old times" we hear. O.B. has been putting in too many long hours of late—too much "overtime" O.B. If Mrs. Jones should read this tell her to call your humble editor who can vouch for good old O.B.'s late hours at 8203 Woodward. Better slow down O.B. . . . . the depression's over—didn't you hear?

In our travels about Detroit Plants the past few days we have bumped into a group of engineers, several times, from the **Westinghouse Airbrake**—wonder what they were doing out here?

The many friends of **A. G. McMann** will be sorry to learn of his demise February 23rd. For seventeen years Mr. McMann was connected with Ford Motor and since 1928 had conducted a Manufacturer's Agency.

Hotels in Cleveland already have been besieged with reservations for September 10th—the date we suspect for the **Machine Tool Builders Association** exhibition. So, we suggest that if you are planning to attend this year you had better make your reservations as soon as possible. If you have been out to the **Ford Motor Company** plant lately, you have, no doubt, seen a large steel structure being erected —a new addition to the rolling mill, we understand. **Hayward Gay** is the new Sales-Engineer who has joined Cincinnati Milling and Grinders-Detroit office. You came to Detroit at a good time, we think, Mr. Gay,—for it looks like a number of **"programs" will shortly be under way.**

Over in Milwaukee, recently Gustaf Jenson an advertising designer spoke before the local American Society of Mechanical Engineers' chapter on closer coordination of art and engineering. The speaker, no doubt, did not have *Tool* Engineering in mind . . . . at least . . . . your editor wants to know . . . . how much *art* can you get into a jig or a fixture?

The great editor Mr. William Allen White it is reported has said that a man's greatest satisfaction is being his own particular kind of a damned fool. Most tool engineers are one kind of "damned fool" with their "pet" ideas, gadgets, fixtures and what not—but we'll make a bet with you that many of these are well worth while and you A.S.T.Eers who are reading this should send them to *The Tool Engineer* for discussion if you want to *really* know what's wrong with them. What we started out to say in this connection was that while most everybody is one kind of damned fool, the fellows who really get into trouble are those who are a couple of kinds at once.

Counterbore and Cutting Industries in Relation To the Machine and Metal Production Industries

★*By* URVING G. THOMAS
Member A.S.T.E.

WHILE perishable tools are generally small compared to the parts produced, they are really the most important factor in parts manufacture. What use is a well designed and efficient machine without its complement of perishable tools? Lately, the machine and cutting tool industries have been getting a little closer—a good move for all concerned.

"Necessity is the mother of invention," however, a recent article in a leading technical journal dealt with a flycutter type of spot facer which has been practically obsolete for thirty years; still, many of our latter day designers would seize on that as a new idea. Spot facing, like many other cutting operations, has evolved slowly from chipping to a science. At the outset of the automobile industry drills and reamers were stepped down, using the small end for a pilot, but as the pilots quickly became mutilated from repeated grinding, this method proved too expensive. Then the fly cutter was resorted to, but you still had to have a pilot for every size hole. Next came the mill end type spotfacer with a taper hole for inserted pilots. This too, had its limitations, since the cutter would split from driving in pilots while changing them.

About this time the integral pilot type counterbore was designed. It had its limitations as the tool was of the solid type and required not only the spotfacer diameter but the pilot diameter as well, and naturally one had to have a spotfacer for every job. While this tool was not the last development for economy, it is still the most successful tool for deep counterboring, but its life is short owing to losing the pilot diameter after a few sharpenings.

Up to that time, all spotfacers and counterbores were made with a solid shank, either straight or taper. This made it necessary to remove it from the spindle by use of drift, which was slow. The Magic sleeve type chuck was produced about this time, which speeded up tool changes considerably, as changes could be effected without stopping the machine. Also, the shell type counterbore with bayonet lock and drive was also in use at the time. The principle was fine because of interchangeability, although at first rather fragile owing to a pin being used for drive. So, while we then had two methods of quick change, we still had the pilot problem to contend with.

The next improvement was a spotfacer with a short, straight, bayonet lock shank and body to correspond, the overall length the same for all groups of sizes, with a holder for each group, which naturally made for quick change.

Then the idea was conceived to put a hole through entire length of cutter and shank, which led to the present method of pilots in groups, whereby any pilot in any group could be interchanged or other sizes of pilots added. Up to then all spotfacers or counterbores were of a single diameter, i.e., each tool cut only the diameter for which it was designed. The demands of economy forced a new development, the stepped diameter counterbore for finishing two or more diamters with the same tool, at one pass.

At the outset, a reamer was stepped, which worked well enough until sharpening ruined the smaller diameter, and materially shortened tool life. There are still some users of this type. Later the alternating flute cutter was evolved; this was good and is still the best, as each diameter carries its own flutes and may be sharpened without affecting other diameters. With this tool, eight operations of boring, facing and chamfering can be effected at one pass. A rougher and finisher is generally used, and will finish to a tolerance of plus or minus .0005. This tool is generally used where accuracy must be maintained at high production.

While the counterbore was progressing, holders were keeping pace. Today, we have quick interchanging inverted balanced drive spotfacers, special cutters, counterbores and integral pilot counterbores. We also have plain holders, drivers, adjustable length, micro-adjustable stop collar, and various types of bushing guided special holders. The demands of automotive, radio, pipe fittings, refrigeration and other industries have forced the development of these quick acting, accurate tools. The machine builders design a machine for a given production; it is tooled and after a short time a 20% step-up in production is demanded. Shortly another boost is demanded.

Not so easy always, but I have seen it stepped up 100% by a combination of diameters on alternating multi-diameter counterbores not using

(Continued on page 16.)

Urving G. Thomas, General Superintendent, Eclipse Counterbore Company, Detroit, Michigan

Editor's note: Much as we would like to print Mr. Thomas' article in full, with its interesting reminscences, space prohibits more than its salient ponts. This condensed versoin, however, follows closely the author's original thoughts.

TYPES OF MEN IN INDUSTRY

★*By* **JOHN YOUNGER**

Professor of Industrial Engineering
Ohio State University

WHEN one pauses to analyze the men you meet in industry most peculiar arrangements come under view. There are so many classifications that they bewilder you until you find there emerges a distinct type of men. The only other analogy you find is in the realm of physics where you mix together all the colors of the rainbow—any way at all—and there emerges the white of daylight.

So we find men classified as healthy or unhealthy—colored or white—pacifists or militants—protestant, catholic, jew or agnostic—republican, democrat or socialist—union or non-union, and so forth, and from all the possible combinations of these there emerges the pattern maker or the machinist or the assembly man or what not. We find therefore that the classification of one's political or religious or national worlds have no bearing at all upon our ultimate workman, and we are forced to seek other classifications.

Perhaps one of the best is to analyze the motives men work for, and we find one man working for love of power such as the chief executive has over the thousands of men in his employ. Another executive may be working for the love of money, not necessarily in the acquisition of money but for the thrill that comes with handling large sums. Such purchasing agents like to feel that they are spending large sums of money. They speak of their inventories not in terms of tonnage but in terms of money values which appeal to them. The treasurers of large corporations are often motivated by the same policy.

Many engineers work for love of service; they like to know that the work they are doing is of benefit to mankind. There is no question of course but that many projects of the engineer are meant not primarily for the purpose of making money but more distinctly for the purpose of being of benefit to the community.

And then some engineers, particularly the research men, work for the love of the actual work they do. They love to "see the wheels go round." They love the smell of oil and the noise of machinery and they are happy in its atmosphere. Some production engineers fall in this category. They are never so happy as when listening to the growl of a heavily loaded machine tool .

There are of course combinations of the above. We believe we are justified in saying that Henry Ford working for money is also thrilled with the power he has and with the service his products bring in transportation.

A story—an old one it is true—is told of three men working in a stone yard. An enquiring passerby approached the first man and asked him for the reason why he worked. "Why," he answered, "I like to cut stone." The second man, answering the same question, said, "I like the five dollars a day I get for my work." The third, a man of vision, actuated by love of service replied, "Why, I am helping build a cathedral."

The writer in endeavoring to find out what type of career a young man is headed for usually seeks the latent motives he has so as to classify him in the proper group.

When one works with men you naturally fall into the habit of classifying them, and it is wise to do so as a knowledge of their characteristics enables one to manage them more intelligently when the time comes.

Most men are characterized by their desire to know the reason why behind work. The writer once was endeavoring to trace an expensive oil leak in the yard of a spring tempering plant. The blueprints of the pipe lines were lost or had never existed so it was necessary to dig holes at various intervals along the yard to determine where the pipe lines might be. A gang of men were gathered together and were told "Dig a hole here." After it was dug they were told "Fill it up again." And so it went for a few holes till one of the men said in effect, "Why in H—— are we digging these holes?" They were then told it was to find an oil feed line. "Then why didn't you say so in the first place and we would have worked harder."

We are indebted to Mr. W. W. Nickols of Detroit for the following classification of men you meet in industry.

The "Yes" Man. He who endeavors to give an answer or do whatever will please the boss regardless of whether or not he himself believes it is done correctly. Sometimes reliance on a "yes" man brings about disastrous results. In designing and testing motor trucks a man of this type was in charge of the tests. He knew that the chief engineer had a pet theory, which was incorporated in the design, and anxious to please his boss he told him it was working out satisfactorily, whereas, the contrary was the true state of affairs. Acting on this erroneous information the chief engineer thought all was well and incorporated the idea in his finished design for production and sales. Naturally when the vehicle reached the customer trouble developed and a serious loss resulted which could easily have been avoided if the head of the test department had the courage of his conviction and said "no" when it was the correct reply according to facts.

The Timid Man corresponds somewhat to the "Yes" man. He is afraid to assert his own ideas either from the fear of rejection or that they may not be correct.

(To be continued)

SOME PHASES OF WEIGHTS and MEASURES

George F. Austin, Treasurer National Conference of Weights and Measures.

★ *by George F. Austin*

as given before the February 14th Detroit Meeting of the American Society of Tool Engineers at the Fort Shelby Hotel.

"THE subject that I am going to talk on is one that you can readily realize and know has considerable length and breadth and one could talk indefinitely and tire you out with details, however, I am going to confine my remarks to the practical application of weights and measures, as it affects your daily lives.

"First I will review some of the earlier steps taken toward the standardization of weights and measures for some time back. As early as the year 1800, there had been no real attempt made to standardize systems of weights and measures anywhere in the world, but in that year several European countries feeling the need of standardization due to confliction arising in their international trade and commerce decided to hold a conference, which was attended by several of the leading European nations of that time. As a result of that conference, the metric system was officially adopted as a basis for determining their weights and measures problems. Subsequently, a measure of length known as the meter and a weight known as the kilogram were adopted as the basic standards for comparison. These standards were made of aluminum and were kept in the archives of the French Academy of Science.

"I now call your attention to the fact that in our own country there had not been any concerted effort made to standardize systems of weights and measures until the year 1827, when the Treasury Department realizing the need for a standard weight to regulate coinage, adopted the one pound Troy weight which was primarily an English standard of weight. Later on, in the year 1837, and likewise due to complications arising in the operation of the custom houses, Congress passed an act establishing standards of weights and measures known as the gallon (231 cu. in.), the bushel (2150.42 cu. in.), the avoirdupois pound weight (7000 grains), and the yard (36 inches). The act also specified that a set of these weights and measures standards be delivered to governor of each State in the Union, to the end that a uniform standard of weights and measures might be established throughout the United States.

"Another step in the progress of weights and measures standardization took place in the year 1875. At that time, seventeen of the principal nations of the world (including the United States) joined in a conference ata Paris, France and as a result of this conference the International Bureau of Weights and Measures was established and the metric system continued as the basic denomination of weights and measures. Subsequently, prototypes of the original meter and kilogram were made and supplied to the several nations participating in the meeting, these prototypes were made of an alloy containing ninty per cent aluminum and ten per cent iridium.

"Up until the year 1901, the responsibility for weights and measures supervision rested in the department of the Federal government known as the Coast and Geodetic Survey. In 1901 the National Bureau of Standards was established and Dr. Samuel W. Stratton was made its first director. In the course of a few years Dr. Stratton conceived the idea of holding a conference of representatives of the several states to instill into those intrusted with the administration of weights and measures laws his own high ideals of the responsibility which is theirs and of the service they should render. This was the beginning of the National Conference on Weights and Measures which has now become a national institution which meets annually in Washington, D. C. to discuss problems pertinent to their work.

Elimination of Frauds

"The functions of the state, county and city bureaus of weights and measures differ somewhat from that of the national bureau. Their duties consist in the enforcement of weights and measures laws, seeing that equity prevails in all commercial transactions wherein weighing and measuring instruments are involved. To accomplish this, it is necessarily essential that the standards used by the various bureaus remain constant, hence this is assured by reason of the fact that the national standards are compared with those of the International

Bureau every six years. The state standards are compared with the national standards every ten years and the county and city standards compared with the state standards every five years.

"The delivery of full weight and measure and the elimination of fraud and misrepresentation have been an issue in commercial transactions from the time of the inception of quantity determination of merchandise down to the present day. It has been demonstrated that there are always those who will avail themselves of an opportunity for an unfair or dishonest advantage, and that even though this number be relatively small, the result of their fraudulent practises constitute a serious problem in their community. Again, it has been shown another group, larger than the one just mentioned, but still constituting a small percentage of those engaged in business, are careless in the conduct of their affairs to such a degree that the community suffers almost as much from their unintentional errors as from the intentional inaccuracies of the fraudulently minded. Still a third group adds its share to the total of inequities attendant upon commercial quantity determination, and this is made up of those whose errors result from ignorance rather than from carelessness or intent to defraud; but while we can be more sympathetic with the man who knows no better, than we can with the others, nevertheless it cannot be overlooked that the shortweight or measure is equally damaging to the injured party whatever its underlying cause.

"While the various phases of the work of the weights and measures official are quite numerous, there are two main divisions of the work. The first has to do with the testing and inspection of the equipment itself, which is used in weighing and measuring; this branch of the work is ordinarily referred to as the mechanical activities of the official. The second division has to do with the way in which this equipment is used, and embraces all the so-called supervisional, activities of the official.

"Under the first division it is the duty of the official to inspect and test with his standards, at regular intervals, every scale, weight, measures, (whether of length or capacity) weighing device, measuring device, etc., used commercially in his jurisdiction. Such of this equipment that is found to be correct is suitably marked to show that it is approved for use; such of it as is found to be inaccurate, worn out, conducive to the perpetration of fraud, or which shows signs of having been tampered with for dishonest purposes is promptly removed from the channels of trade until it is again in proper condition for use. Thus, through his mechanical activities the official secures to those in business the possession of accurate and properly designed weighing and measuring equipment with which to carry on their trade.

"Under the head of supervisional activities comes such work as check-weighing or check-measuring packages of merchandise that have been delivered to a customer, that are ready for delivery to a customer, or that are put up by the merchant in advance of sale; checking the quantity of package goods put up by the manuufacturer; checking loads or deliveries of fuel, ice, etc., investigating complaints of shortages or unfair practices; educating buyers and sellers in general, as to their rights and duties under the weights and measures laws; teaching the retail purchasing public—the consumers—how to buy and how to help in protecting their interests; and developing that healthy spirit of cooperation between the department and each of the several groups with which it deals, without which the greatest measure of success can never be realized.

"This supervision has resulted in the elimination of the old type taxicab meter with which it was possible to "jigger" the flag back and forth thereby registering extra dimes above the actual amount of the fare; the hand adjusting zero, indicator of computing types of scales; the "do dads" and "what nots" so commonly found on the old type gasoline pumps to serve a legitimate purpose, but which were used on many occasions to defraud the customers; the use of manifold piping on vehicle tank trucks without check valves to circumvent the bypassing of liquid from a full compartment of the tank to an empty compartment during the process of a delivery.

"The value of this work can be further realized from the fact that on our initial test of prescription scales in drug stores, weights and glass graduates it was found necessary to condemn approximately 25% of the equipment in use, as against a condemnation of but 3% on a subsequent test made two years later. Some of these prescription scales required as much as 10 grains to move them from position of equilibrium, while some of the weights were as much as 30% in error.

Some Instances of Short Measure

"To cite instances that have come to our attention, instances somewhat beyond anyone's imagination are as follows: On one occasion a lady purchased three bushels of potatoes from a peddler. These potatoes were ordered to be placed in a barrel in the basement while the lady went to get her pocketbook. After looking at the barrel-ful of potatoes from the top of the stairway, the lady paid for the purchase. That evening her husband attempted to move the barrel away from the furnace and in doing so tipped the barrel over, exposing the two empty bushel baskets jammed in the bottom of the barrel which had been covered over with one bushel of potatoes. On two different occasions it fell to our lot to order and pay for five gallons of gasoline, and after examining the 'buy' tank found it to contain nothing. And on other occasions when the 'buy' car was used, shortages of from one pint to three gallons were not uncommon in the early days of the 'buy' car. A few years ago, a commission merchant received sixteen cases of red raspberries by express and after examining the berries to see what condition the berries were in, found each quart box within the cases to contain a handful of grass beneath the berries.

"On one of our gasoline 'buy' campaigns, we made 391—5-gallon purchases of which 54 deliveries were found to be short in amounts ranging from 1 pint to 1¼ gallons. The fines resulting from the

VOCATIONAL ORGANIZATION

Cold reason, not mass hysteria, should direct the creative engineering worker's vocational organization

By **A. E. Rylander**
Member A.S.T.E.

FROM criticisms advanced, pro and con, there seems to be an impression in some quarters that the previous article was a blanket condemnation of unions in general. That is not so. The writer merely showed why, in his opinion, organization of draftsmen along union lines is impractical, since the majority are averse to union affiliation. Recent events seem to support that opinion.

Personally, I am not greatly concerned whether draftsmens' organizations become union or not. What I am concerned with, as a designer, is that such organizations be directed by men in my vocation, and not by professional labor organizers, also, that membership decision be a matter of cold reason rather than of mass hysteria. Let me make this clear.

A clever speaker, say of the Senator Soaper kind, can often sway an audience with the wind of oratory, and, playing on prejudice, fan it to an unreasoning flame. Many a meeting has been stampeded into questionable resolution and action by an unprincipled speaker, simply because a mass of people thinks with its emotions and not with its reason. That is a truism. Yet, the same oration would seem trite and banal in cold print, where it could be as coldly analysed. That, in brief, is the object of this writing, to appeal to individual intelligence and not to mass emotion. The problems confronting the men in the engineering and designing vocations are too vital, not only to themselves but to industry, to be settled en masse without first being considered by the individual and discussed by minority groups.

Now, workers organize for just one purpose, as a rule—to promote their social and economic welfare. Such organizations can be projected along any of several lines: A Cooperative alliance for the purchase or sale of commodities, a mutual benefit association, a union to compel wage increases by employers, or, a society formed to promote their craft, art or profession through education and mutual service, thereby indirectly and slowly raising vocational standards because of superior training and membership prestige. In the latter class the American Society of Mechanical Engineers, the Society of Automotive Engineers and the American Society of Tool Engineers, among others, can be cited as examples. However, the average worker has neither the patience nor foresight to choose the slower and none too certain course. The Englishman who refused a knighthood that he might later win a lordship is no example for the worker who wants quick action, which, by the way, is often obstructed by equally sudden reaction.

The "Draftsmens' Union"

Assume now, an organization of draftsmen which, that we may not embarrass or compromise existing associations, will be known as the Amalgamated Designers. In this connection, illustrative cases will also be camouflaged, as will scenes of action, for the same reason. Lest these reasons be misunderstood, the writer puts himself on record right here as being in sympathy with the objectives of these draftsmens' societies, whose memberships comprise, on the whole, the finest body of men in the ranks of industry. This, however, does not commit him to sympathy with methods which may obstruct those objectives.

In order as they come to mind rather than of importance, the objectives of our hypothetical Amalgamated Designers would be: (1) higher wages, (2) vacation with pay, (3) better working conditions, (4) steady employment and (5) shorter working hours. To these some labor reformers would add a sixth—an act forbidding discharge of an employe except on long notice. Not a bad idea, provided it worked both ways and didn't discourage the boss from *hiring* on *short* notice.

Such relations seem to work satisfactorily in a certain European County and offer certain advantages, among them a marked reduction in labor turnover. However, industry there is thoroughly unionized, with a resultant levelling of wages (to minimum levels, as usual) so that there is little incentive for the worker to shift from job to job. In the technical fields salaries vary as everywhere, and in direct ratio to training, education and ability. Considering these objectives in turn, there can be no question but that engineering workers are comparatively underpaid, considering what they are supposed to know. (Please note the qualifying "supposed.") There is no reason within the limits of common sense why a draftsman, for instance, should not have higher compensation than the brick masons or plasterers, who often as not are untrained and illiterate, but their *crafts are organized*.

Of course, it may be contended that these are seasonal occupations, and that their average wage is no more than that of the lesser paid crafts steadily employed. But what about draftsmen? Is any employment more seasonal than the tool designer's, who is hired for a program, and, working intensively to complete it on time, is sent home on a moment's notice. Not laid off or fired, but just sent home.

Well then, if the manual worker compels wage increases because of union affiliations and collective bargaining, why shouldn't the designer of superior mentality and education, organize to fatten *his* pay envelope? Especially as management has shown no overt enthusiasm in that direction. Draftsmen have answered that question—by organizing. All right, what then? Well, they can proceed along several lines, all of which, naturally, have been considered and discussed, and, to some extent, tried. They can resort to collective bargaining, or threaten strike, or declare a closed shop, which limits employment to association members only, or, again, slowly advance wages by first concentrating on the smaller employers, as the jobbing shops. Let us here consider the merits of these various methods, bearing in mind, of course, that the discussion is one sided and only reflects the writer's personal opinions.

In the first place, success of any or all of these methods means just one thing—a wage level whose maximum by few precepts of mass coercion will ever attain the minimum sought by the men. Such a wage level would be harmful to the designing vocation, which is analogous to no other craft, art or profession in the mechanical or industrial fields. No other branch of industry, for instance, has a compensation scale ranging from about 80¢ per hour to $25,000.00 or more a year. No other vocation offers such incentive to ambition, or so richly rewards sheer ability.

The engineering field is the arena of progress. The work is highly creative, which is perhaps one reason that the youngest novice will fight like the devil in defense of an idea, a reason, also, why the disillusioned veteran keeps on trying. The fugitive phantom of success is ever ahead; there is no limit until you are licked. Considering this, it is not unreasonable to suggest that the individual draftsman, for reasons of selfishness or personal ambition, either way you look at it, will be the strongest deterrent force in resisting wage levels.

The personal factor also enters into the closed shop system. Sir Knight-of-the-pencil knows that as long as he is a free lance he can tell Sir Boss what to do with his job, and go hunt himself another. The wide world is his, and right well he knows it, the temperamental cuss. But, should he tell the boss of his union local to kiss the blarney stone he is just "out of luck," in good old army parlance. Free men do not readily surrender liberties.

As far as a strike is concerned, that is an empty threat until draftsmen are organized nationally, a matter of remote accomplishment. Even if seriously considered, a strike would be abortive, for reasons so obvious that elaboration is unnecessary. Anyway, the public is fed up on strikes, which have resulted in little benefit to the strikers but great harm to the recovery program. Besides, the men don't want to strike, which is indicative of their intelligence.

They want the right to work, and will resent any interference with that right, a fact which has already been adequately demonstrated. As for hours, it is futile to establish arbitrary schedules until employment has been stabilized, and any association of draftsmen that would enforce a 40 hour week among its members must first guarantee them work, something that even their employers cannot do. Pending such stabilization, overtime will have to serve as a bridge between employment peaks.

The Management's Side

Overtime, of course, should be paid for at extra rates, a contention with which even the employers will agree, with reservations. For a jobbing shop, having contracted work at prevailing rates, obviously cannot pay overtime, with an even break, without first arriving at some agreement with the manufacturers on whom they are dependent. To do so lays him open to suspicion of padding hours, a resort which the average small shop owner is too honest to consider.

In this connection, it is an open secret that the representatives of at least one draftsmen's association (let's call it the Amalgamated) fell asleep at the switch. A meeting had been arranged between jobbers and association agents, ostensibly for the purpose of discussing hours, wages et cetera. From informal discussion in the various offices and shops, the jobbers attended that meeting prepared to consider some compromise relative to overtime rates. I say a compromise; the N. R. A. apparently does not consider anything less than time and one half, a serious consideration since that rate would often exceed costs, let alone overhead.

Was this subject broached? Not so you could hear it with a loud-speaker. Instead, the bone of contention was recognition of the Amalgamated as a union, with indirect reference to a closed shop. This the jobbers declined to consider, and obviously, they did not bring up the subject of overtime. Why should they, since that would have meant another session with their employees? So, Opportunity knocked unheeded.

Recognition of a union. . . . ! Gimme the cash, and let the credit go.

From the foregoing, it must not be inferred that attainment of the objectives stated is impossible of accomplishment. On the contrary, there is every indication that the day of the engineering worker has just begun to dawn. There are strong forces working in his behalf; management for one, although it may not concede that thought, except as it is expedient to make exceptions, and the memberships of bona fide engineering associations, which have much in common with, and a genuine liking and respect for their fellows who are sincerely trying to improve vocational standards. The difference is not in objective, as stated previously, but in method.

This will be treated in the following installment.

PHOTOGRAPHS OF THE BALL

Many members of The Society have expressed a desire to have a picture of the crowd which attended the Ball given last month. A limited supply of these photographs is on hand at the Secretary's office and may be had at $1 each.

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Differential Gear Blanks Turned On Automatic 6" Stub Lathe Efficiently By Clever Arrangement

A clever arrangement of cam-fed slides on the Sundstrand Automatic 6" Stub Lathe shown in Fig. 1 is highly efficient in turning differential gear blanks. These steel forgings come to the 6" Stub Lathe with hole bored and broached, and one end faced, as shown at left in Fig. 2. Operator places a blank in position, expands pneumatic work driver,

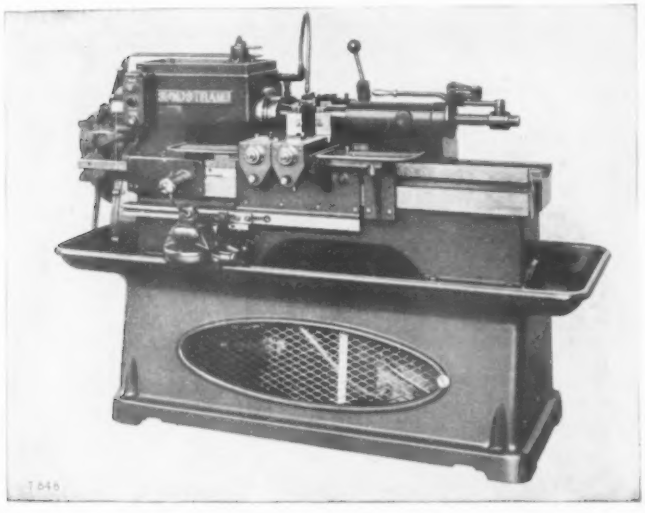

Fig. 1—Sundstrand Automatic 6" Stub Lathe, with cam-controlled slides, for turning gear blanks.

advances tailcenter by means of quick acting lever, starts automatic cycle of Stub Lathe. When tools return to starting position and spindle stops, the blank has been machined as shown at right in Fig. 2. Close-up of tooling is shown in Fig. 3. On the front carriage, a tool in the right-hand block turns the hub diameter and at the same time a tool in the left-hand block, which is mounted on an independent cam-controlled slide, turns the back angle on the gear blank. Meanwhile the rear slide feeds in. One tool in the block at right rear faces back of blank, another faces the end of the hub, a third chamfers the corner. Tool in cam-controlled block at left rear feeds straight in and then at an angle towards the left to turn the face angle. Work

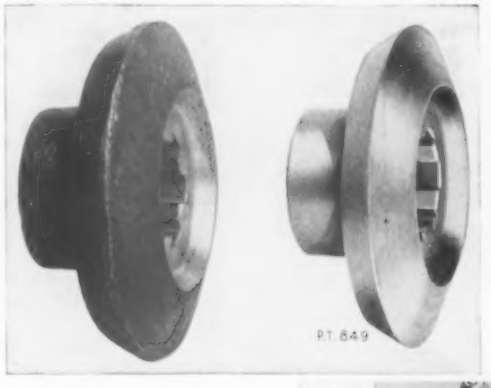

Fig. 2—The part machined. Before Stub Lathe turning, at left; afterwards, at right.

done; the spindle comes quickly to rest, coolant shuts off, all tools return quickly to starting position. Forward movement of slides is indicated by arrows on tool blocks in Fig. 3. Production is high, and only a small part of the operator's time is required to run this machine.

▼ ▼ ▼

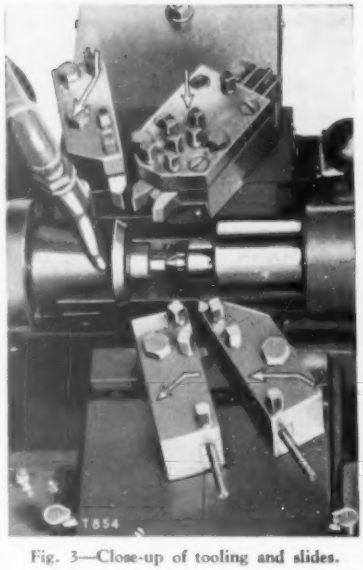

Fig. 3—Close-up of tooling and slides.

In addition to the one shown above, we have already engineered other applications of the recently announced Sundstrand 6" Stub Lathe, all eminently successful. We shall be glad to supply complete production and cost data on any or all of these, and to discuss with interested executives the many other cost-cutting possibilities of this and other Sundstrand machine tools.

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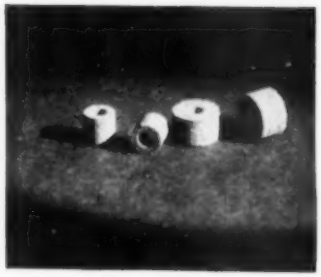
DIAMONDS in Grinding Wheels

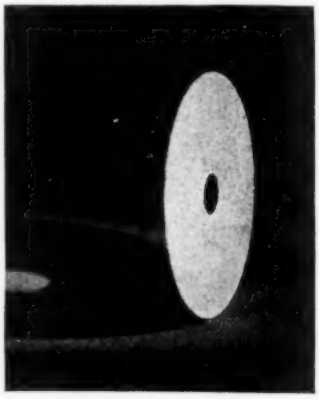


Norton Diamond (bort) Internal Wheels

THE introduction to American industry of the cemented carbides a few years ago started exhaustive research and experimentation in grinding wheel manufacture to produce a means of grinding or sharpening tools of this sensationally hard and durable material. It soon developed that the most successful of the commercially used abrasives was silicon carbide (Crystolon). These wheels are being widely used today for the grinding of cemented carbides although a lapping operation is in some instances necessary to obtain desired finishes. It was soon learned also that to eliminate the lapping operation a still harder abrasive substance than silicon carbide was necessary. The hardest known substance is the diamond.

Hence, grinding wheel manufacturers looked to the bort diamond as the abrasive most likely to produce the desired results. Bort is the name applied to the grade of diamond used by industry, a grade not suitable for gems but with a hardness that makes it more suitable for grinding.

The first Norton wheels using diamonds as the abrasive were produced several years ago and met with some degree of success. They were small internal wheels (sizes ¼ x ¼ x ⅛" and ⅜ x ¼ x ⅛") for grinding cemented carbide wire drawing dies.



Norton Diamond (bort) Cut-off Wheel

The next development in commercializing the bort or crushed diamond wheel was with a size 4 x ¼ x ½" for producing sharp corners on cemented carbide tipped tools of special shapes such as used in screw-machine work.

Then came the cup-shape wheels 3" diameter with ⅜" rim for lapping small cemented carbide tipped tools and grinding the clearance on reamers, surface broaches and milling cutters tipped with cemented carbide.

Still another application is in extremely thin cut-off wheels for cutting up cemented carbide shapes.

The Norton diamond wheel of today is the result of many years of experimentation by the Norton

(Continued on page 18.)

New Literature Available

The Precision Gage Catalog No. 2 recently issued by R & M Mfg. Co., Detroit, is in big demand with Tool Engineers. It carries full information on the physical dimensions of cylindrical plug and ring gages in accordance with American Gage Committee Standards—also the chromium plating of both new and worn gages. Copies will be supplied readers of *The Tool Engineer* on request.

Eclipse Counterbore announces their new catalog No. 35 superseding all previous issues. Brief descriptions in large type cover all of their various specialized lines—also a special tool section with illustrations of practical applications in plants are of special interest to tool engineers and production executives. The catalog is unique in that a five ring loose leaf binder is used and a very novel system of indexing makes it very easy to use. Address Eclipse Counterbore Company, Detroit, Mich., for copies.

This handbook, published under the title, **"Special Washers and Stampings," lists over 19,000 tool-sets for producing washers and stampings having daily application in the design** and manufacture of practically every mechanical product made today. This publication, it is claimed, provides a source reference for the selection of assembly parts and special units which can be specified in the design and construction of new products. Copies may be had on request to Wrought Washer Mfg. Co., Milwaukee, Wisconsin. Mention *The Tool Engineer* when writing.

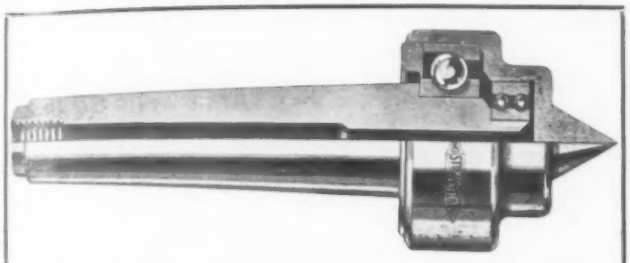
Counterbores in Relation to Production

(Continued from page 9.)

any of the late hard cutting steels.

There is one thing to consider; there is a limit to diameter ratio on alternating multi-diameter cutters. In stepping up from ¾ to 2½ dia., one size must be sacrificed to the other, as to run the proper speed for the small diameter may burn the large diameter, or, vice versa, you may break the small diameter. This may be remedied by using hard metal in the larger (or even both) diameter. However, in limited production and with limited tool inventory, a tool of this kind can be used advantageously by averaging the speed. And outside of high production demands, these quick change holders, drivers and cutters play an important part in small shop production where a single spindle machine can be used without changing the set-up.

In conclusion, about all you have to do today is to furnish parts print or sample part to the tool industry and they will make a tool suited to the job. Just tell your troubles to a reliable cutting tool manufacturer—he'll do the rest.



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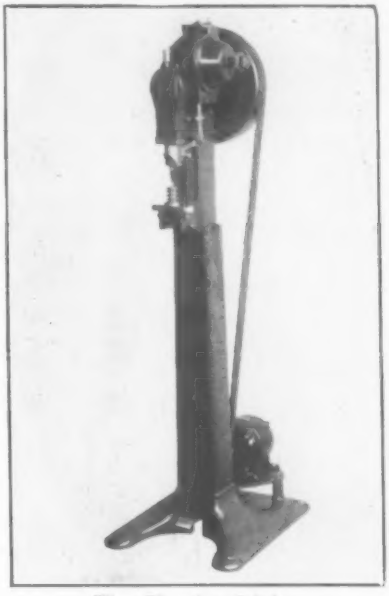

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Diamonds In Grinding Wheels

laboratories and field work by Norton engineers—experience that has demonstrated the efficiency of the resinoid known by the trademark Bakelite as the bonding material, experience that has determined the most suitable range of grain sizes of carefully crushed and graded bort, experience that has shown just what percentage of diamonds to use to obtain wheels with the desired grinding and lapping action.

Although the field for this type of wheel is somewhat limited, the product produced by the Norton Process using diamonds (bort) as the abrasive, and Bakelite as the bond met with such promising success that a patent was applied for and No. 1981970 has been granted by the United States Patent Office.

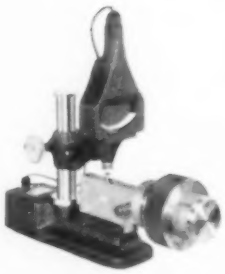
The foregoing information has been furnished through the courtesy of Mr. C. W. Jinnette of Detroit. An early issue of THE TOOL ENGINEER *will describe the economy and how to use diamond wheels.*

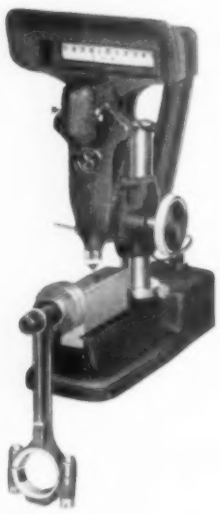
Some Phases of Weights and Measures

(Continued from page 11.)

prosecutions which took place following this drive amounted to $1,140. On another campaign, we made 382—5-gallon purchases in 3 days time, of which 40 deliveries were found to be short in amounts from 1 pint to 1 gallon. The fines resulting from these prosecutions amounted to $790. And of further interest and greater importance is the fact that using as a basis for determination, the facts of these drives, the number of gasoline stations in Detroit at that time, the prevailing price of gasiline, approximating the number of sales per day—per gas station, we find ourselves confronted with figures which point out, beyond any question or doubt, that the loss to the consuming public amounted to the staggering total of $137,808.00 per year approximately.

"The importance to a community of adequate weights and measures supervision can scarcely be overestimated. Next to the personal safety and health of the people, one of the most important of the fundamental obligations of the State or municipality to its citizens is this of the regulation of commercial weighing and measuring instruments and the exercise of a reasonable control over the users thereof. There is no single individual in a community whose interests are not affected by these considerations, for the weighing and measuring operations, to a greater or less degree, enter into the distribution of all the necessities of life, particularly of food and fuel. Furthermore it must not be lost sight of that in the case of the less prosperous members of a community, those whose purchases are necessarily made in the smallest quantities and most frequently this interest is a vital one."





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TOOLS DIES GAGES

DETROIT, FITZROY 2990 MICHIGAN

THIS MONTH'S COVER

NEW TYPE SPECIAL MACHINE SPEEDS PRODUCTION ON PISTONS

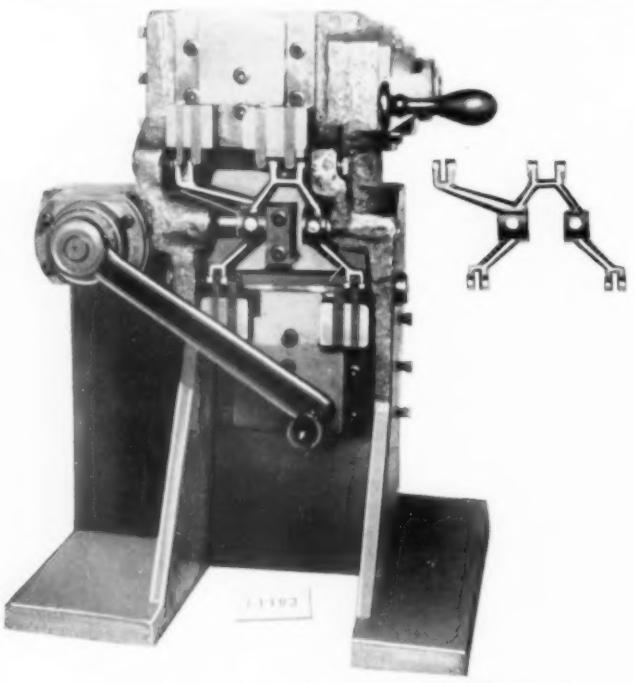
The machine shown on the front cover design is a single purpose machine for slitting a horizontal slot into the lower ring groove of an aluminum alloy piston, and a vertical slot into the skirt. This machine was designed and developed to suit the customer's specifications by the Snyder Tool & Engineering Co., of Detroit.

Single purpose machines are in greater demand today than ever before, because their production is higher and more efficient, they are fool proof, and still flexible enough to be adapted to engineering changes.

The piston slitting machine as shown has two individual spindles, one vertical spindle and one horizontal spindle, ball bearing mounted, with individual motor drives and pick off change gears enclosed in separate housings. These two housings are mounted on a sliding table and arranged with adjusting screws for depth of cut in relation to each other, allowing for regrind of cutters. The sliding table is powered with a hydraulic feed system and is fired by the index plunger handle on the rotary table, which is arranged to be either hand or foot operated. The index plunger is arranged with a time delay pilot valve to insure the entrance of the index plunger into the rotary table before circuit can be fired. The index table is full ball bearing hand operated and can be operated clockwise or counter-clockwise. On the rotary table top are mounted seven fixtures, cutting down the index cycle time to a minimum.

The cycle of operation is as follows, counter-clockwise rotation; after the index plunger is released the hydraulic system is fired, the slide that carries the two spindles rapidly approaches, feeds in to a determined stop (cutting the horizontal slot into the lower ring groove), rapidly reverses and stops. The index plunger is then released to index the table simultaneously cocking the hydraulic system and with a spring pressure the index plunger is forced into the next index hole of the rotary table top, firing the hydraulic system automatically again, this time cutting the vertical slot into the skirt. After the table is filled, these two cuts are simultaneous—producing a completed piston at each pass.

This machine is capable of producing six hundred (600) pistons per hour, or four thousand eight hundred (4800) in eight hours. Disregarding the loading, the hydraulic system can make a cycle in three seconds. So any production obtained over six hundred (600), depends upon the operator.



SWARTZ—Engineered and built

Part—Brake lever

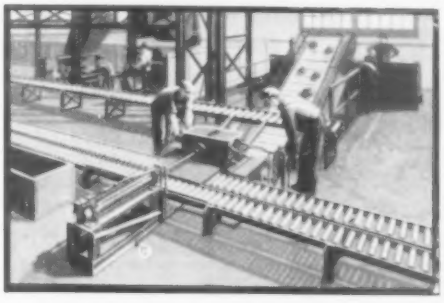
Operation—Drill complete—three ways

Features—Lever is located and securely clamped by the action of two fixture locks. Left hand lock operates central location. Right hand lock operates two vertical slides engaging prevously milled slots, to locate and take drill thrust.

SWARTZ TOOL PRODUCTS CO., Inc.

5259 Western Avenue DETROIT ORegon 7990

Another Hanna Cylinder Application



The Hanna Cylinder because of its low first cost and economy of operation has more to recommend it for obtaining straight line motion than any other method. A positive push, pull or lifting motion is obtained by a Hanna Cylinder of such diameter as may be selected to deliver the exact pressure desired.

If this particular style does not meet your requirements there are many others available, one of which will.

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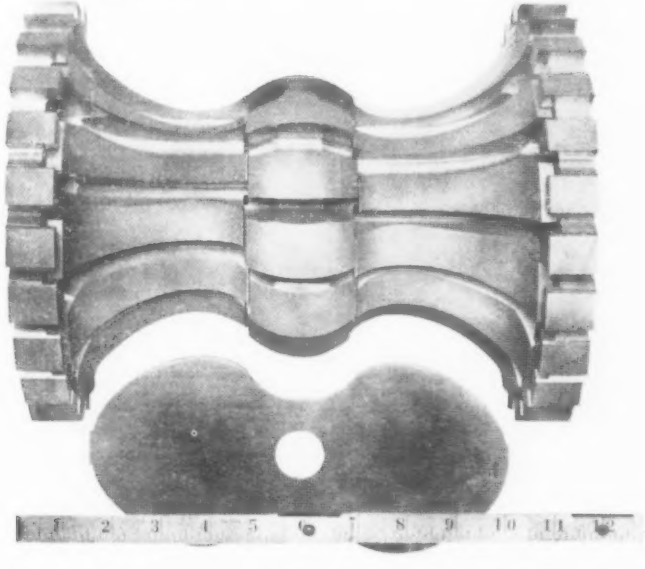
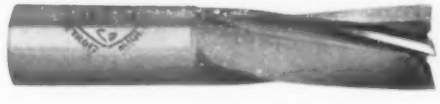


OR THE SIMPLEST STANDARD



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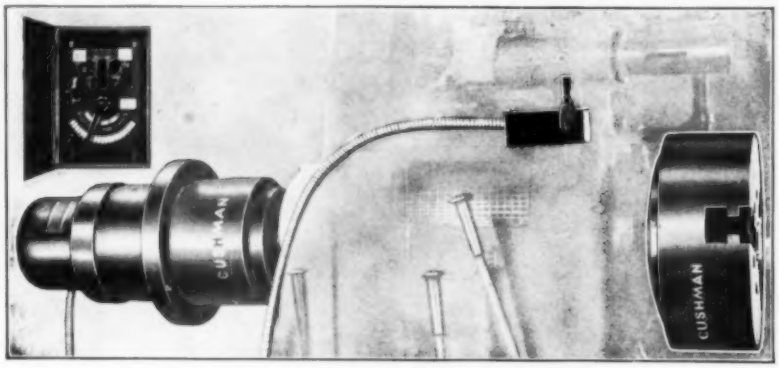

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No. C 12

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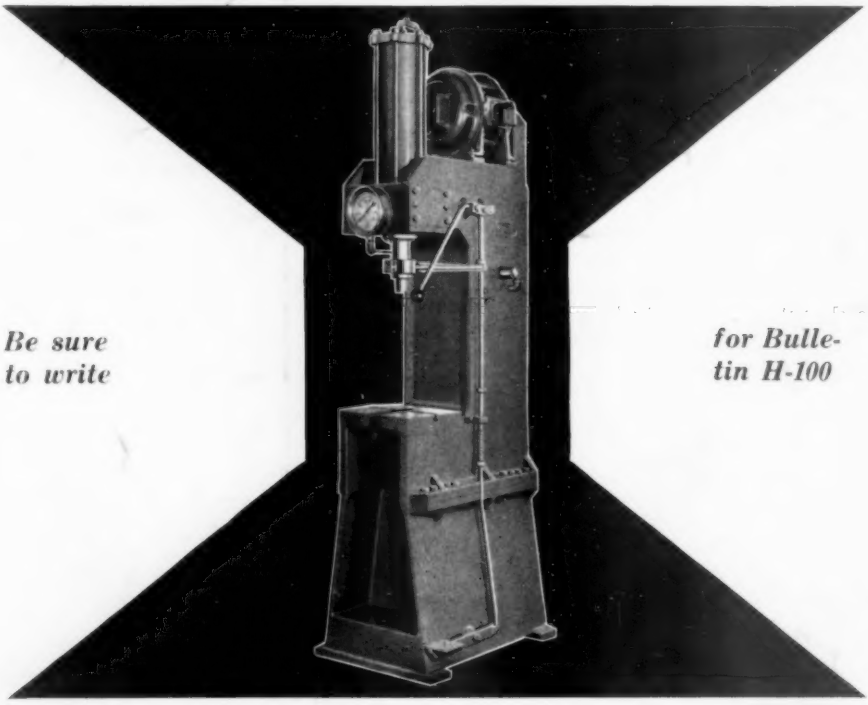

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